we have before us the facts of organisation and development. But it is one thing to consider a single set of relations, such as those of causation, to the exclusion of the rest, for the sake of clearness of knowledge, and quite another to say that this particular aspect of the object exclusively constitutes it. Mr. Romanes thinks that biologists do not require any transcendental analytic to inform them that an organism is something more than a mechanism. But he finds it startling to be told that in the investigation of an organism we are to rise above the category of causality, and carry into our inquiry the conception of teleology. Surely the latter proposition is the logical consequence of the former. No one says that the category of causation is not to be used in the investigation of the phenomena of organisation. In anatomy, and in its dynamical correlative physiology, the parts of the organism are constantly treated as independent of each other, and related as cause and effect. But this is an abstract point of view employed for a special purpose—the obtaining of measurements—and is qualified by the recognition of the complete conception of the organs as part of a self-conserving whole or system. This is all that is implied by the unfortunate term "teleology" when used in the theory of knowledge. What Kant professes to show is that this fact of nature cannot be reduced to or expressed in terms of the dynamical and statical relations of time and space. No doubt the laws of matter and energy apply in biology as strictly as elsewhere, but they do not express, much less exhaust, biological phenomena. And therefore we must be careful in biology not to distort those conceptions or hypotheses which are, despite assertions to the contrary, the necessary guides and interpreters of observation and experiments by the exclusive employment of categories which, like causation, neither are drawn from, nor are adequate to, the facts. The subject of the detailed effect of the neglect in this reference of Kant's warning I will not pursue here, as my brother has treated it at some length, with special reference to the objections made by Mr. Romanes, in a paper which will appear elsewhere. It ought to be borne in mind, as illustrating the point of view here emphasised, that Kant himself was one of the first to advance the nebular hypothesis. The truth is that, in speaking of the universe as having presumably originated from a mass of incandescent vapour, Kant, and everybody else, so far from reducing life to mechanism, is really raising mechanism to life. Kant would have told us that in the phenomena of such a developing mass there were potentially present all the relations of the universe as we know it. No doubt the approximate conceptions for the advance of knowledge are at this point the laws of matter and energy. But these do not exhaust the object, and if we have abstracted from the others we have done so in just the same way as we have abstracted from fact that the phenomena are there only for a percipient subject.

Such considerations and the doubts they raise may seem remote. But the number of those is increasing who think that they should be better known to and understood by men of science. It will not do to say that such criticism has no bearing on scientific inquiry until it has been ascertained whether its neglect has not already—even in matters of minute detail—misled and stultified certain phases of such inquiry. Fact and theory are not so very easy to distinguish. With scientific method no one wishes to interfere. But we would subject to closer investigation the question whether what are commonly taken to be the legitimate problems of science are really what they profess to be. It is not to the "Hannibals" of science, but to her Don Quixotes that Kant addresses himself.

R. B. HALDANE

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

The "Transmission Eastwards Round the Globe of Barometric Abnormal Movements"

THE following questions suggest themselves in connection with the above matter :—(1) Is it a fact that atmospheric movements of such small amplitude take the form of waves, and, if so, that the waves have so slow a rate of travel? (2) How is it to be accounted for that the waves travel eastward more slowly than westward? And (3) How can it be explained that they appear at an eastward station with a greater amplitude than at a westward?

With regard to the first question, it may be said that almost absolute proof of the existence of such waves can be brought forward. A recent investigation, the results of which are not yet published, has shown that a barometric wave measuring from maximum to minimum only ·108 inch, which occurred in Western India in 1877–78, was accurately reproduced over the same region three years later, namely, in 1880–81. The wave at the time of its reappearance had all the larger details which it possessed during its original appearance, these details agreeing in many cases to within less than ·001 inch. But whereas the amplitude in 1877–78 was ·108 inch, in 1880–81 it was only ·048 inch. Waves have also been recognised which appear in the summer half of the year at the northern part of Western India and travel southwards, arriving at the southern parts between two and three months after their appearance in the north; and also waves which appear in the winter half of the year at the south and travel northwards. This movement from north to south and from south to north during alternate halves of the year has been traced regularly since 1869; and indeed is so constant that in many cases it has been possible by means of it to calculate quantitatively the average position of the barometer during the next three months.

The second question was answered in my paper which you were good enough to publish in your issues of the 9th and 16th ult. Owing to the upper air currents travelling from equatorial to higher latitudes, and the lower air currents travelling equatorwards, there must be in high latitudes a general movement of the atmosphere eastwards, whereas in tropical and subtropical regions there must be a general movement westwards. This at once explains why in tropical and subtropical regions the atmospheric waves should travel more rapidly westwards than eastwards.

The third question is a difficult one, and the answer not perhaps quite satisfactory. If it were the case that undulations in fluid bodies become heaped up and increased in amplitude when travelling in a direction opposite to that of a current, and are affected in a contrary way when travelling with the current, a satisfactory answer might be furnished.

But an explanation may be sought in a different direction. If the circumstances of any latitude situated a little way from the equator be considered, it will be noticed that two principal air currents are flowing there—a lower one with a westward component of a certain velocity, and an upper one with an eastward component of a less velocity. Now it may be supposed that these two currents are affected by waves of two kinds, the first being waves common to the two currents, the second being waves which have been generated in the two currents in regions from which they are proceeding. And there are two reasons

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why this latter class of waves should affect the barometer more strongly in the case of the current with the eastward component. In the first place that current is proceeding from the tropics, the region in which all great atmospheric movements originate; and in the second place there is a greater mass of matter moving with it than with the other current, there being not only an equal quantity of dry air returning northwards to compensate for that which is flowing southwards, but there being also a considerable quantity of water vapour, which does not return southwards in the form of vapour, but, having been precipitated as rain, returns with the ocean currents. It may not be easy, but still it is perhaps possible, to demonstrate how this fact should explain the greater amplitude of the eastward than of the westward transmitted waves.

A. N. PEARSON

Meteorological Office, Bombay, September 4

Apparent Disappearance of Jupiter's Satellites

ON the morning of October 15 next Jupiter will appear to be deprived of the satellites usually attending him. This somewhat rare phenomenon has only been observed on four occasions during the present century, as follows:—

May 23, 1802	September 27, 1843
April 15, 1826	August 21, 1867

In 1826 the disappearance of the Jovian moons extended over an interval of 2 hours; in 1843 the interval was thirty-five minutes; in 1867 1 hour 45 minutes; but on October 15 next the phenomenon only endures 19 minutes (*i.e.* from 3h. 56m. to 4h. 15m. a.m.). The second, third, and fourth satellites will be in transit across the disk, while the first will be occulted by the planet. On August 21, 1867, the first, third, and fourth were in transit, while the second was eclipsed, and afterwards occulted. These occasions offer excellent opportunities for comparing the appearance of the satellites while in transit, and for re-detecting the dusky spots which were formerly distinguished upon them by Dawes, Secchi, and others. On August 21, 1867, I observed the phenomenon with a 4¼ inch refractor, and noticed that the satellites appeared nearly as dark and distinct as their shadows while projected on the disk of their primary.

There is a remarkable agreement in the intervals separating this rare occurrence. Between the disappearances of May 23, 1802, and April 15, 1826, there is a period of 24 years less 38 days (= 8728 days), and between those of September 27, 1843, and August 21, 1867, 24 years less 37 days (= 8729 days). The other intervals are irregular, there being 17 years 165 days between that of 1826-1843, and 16 years 55 days between that of 1867-1883. If, however, there is a regularly-recurring cycle of nearly 24 years, as the above dates apparently indicate, after every alternate disappearance of these satellites, then we may expect a repetition of the phenomenon on about September 7, 1907.

W. F. DENNING

Bristol, October 6, 1883

The English Viper

IN regard to the English viper, I send a small contribution to the information that Mr. R. Langdon seeks in your issue for August 2 (p. 319). During a residence of more than twenty years on the outskirts of the Forest of Dean, the following facts concerning the adder's bite came more or less under my notice:—

1. A girl was bitten on the thumb, she sucked the bite, and her head, throat, and tongue swelled so much that she nearly died of suffocation and starvation. She was laid up more or less for six months, and folks said that she was never herself again, but became "silly-like," but so far as my memory goes she was but weak minded before the bite.

2. A gamekeeper was bitten on the thick part of the hand. He could hardly get home, and did not leave his bed for three months afterwards.

3. A woman in the Forest was bitten on the thumb, her arm swelled, and became black, but on the application of a herb (which I cannot identify, though she called it "adder's tongue"), the swelling went down at once, and in a day or so no trace of the bite remained.

4. Though the following case did not occur in our neighbourhood, yet as the patient was a family connection, and the details were given me by his mother, I bring it forward. The young man was bi ten in the hand, and his arm swelled rapidly to such a size, that the coat sleeve had to be cut open. The youth was ill for many months, and more than a year afterwards had not regained his former mental and physical condition.

5. Cows were often bitten on the legs, but more often on the udder; they never died from the bites.

6. Sheep often died; and lambs, so far as memory serves, did so invariably.

7. A pointer was bitten on the chest. The bite did not bleed, but the dog swelled quickly and could not walk; it was ill for a long time, but did not die.

8. I remember hearing that a little girl had died from the bite of an adder; but I mention the case with little confidence, as it did not come within the limits of my observation.

In 1865 or 1866 adders were more numerous in our neighbourhood than the "oldest inhabitant" had ever known them to be. The farmers were advised to turn their pigs into the fields, and and the result was that wherever the pigs ranged the adders were nearly exterminated. A student of folk-lore would find a wide field in the traditions respecting the adder and its bite. In our neighbourhood the fat of the adder, especially that of the biter, was considered the best antidote for the bite. To roast an adder alive was not only a means of relieving the sufferer, but by making "the varmin squeal" it was said to draw others from their holes, and thus lead to their destruction.

KATHARINE B. CLAYPOLE

THOUGH not precisely in reply to Mr. Langdon's question, yet I add a short postscript to my wife's letter.

In this district we have two venomous snakes, the rattlesnake and the copperhead. The former is now becoming scarce, but the latter is still common. I have never been able to learn that any human being has been killed by the bite of either of these snakes in this neighbourhood. Bites of the rattlesnake are exceedingly rare, but I have known some, and heard of many persons who have been bitten by copperheads.

1. A lady was bitten on the foot at her garden gate; the leg swelled up to the thigh, and was exceedingly painful. She was more or less ill for a week.

2. A boy was bitten on the foot, and the leg swelled and turned black. No remedies were applied for many hours. A poultice of some herb which I have not been able to identify was put on the wound, and in twelve hours more the swelling had gone down, and the boy could walk.

3. In a third case of which I have heard the wound was said to reopen, or at least to become irritable, every year at the date of the bite.

4. A friend of mine had a dog which was bitten by a copperhead. He treated the wound with new milk, but the dog died.

5. In one case of which I have heard a man was bitten by a rattlesnake, but though I do not know the details of the case, the man is still alive.

6. A dog belonging to the friend mentioned above was bitten by a rattlesnake, and treated with new milk. He recovered.

I have heard of and known other cases of snakebite, but similar results followed. The remedies recommended for snakebite are too numerous to mention. Whisky in large doses is the most popular, and it never seems in such cases to produce intoxication. The common remedy—"the fat of the snake that bit you"—is, I suspect, an ingenious device for insuring the destruction of the reptile. It would appear as if the bite of the two snakes which I have mentioned can hardly be as deadly as is commonly supposed. The frequent swelling of the head and tongue appears to me to be caused by sucking the poison from the wound when a sore may have existed in the mouth. Much probably depends on the size and condition of the snake, the time of year, and the place and depth of the bite.

E. W. CLAYPOLE

New Bloomfield, Perry County, Pa., September 3

Solar Halo

I HAD the pleasure of witnessing, this morning, what Mr. Backhouse refers to in the last number of NATURE (p. 515) "as seen on rare occasions—a small portion of an ordinary halo brilliantly coloured."

Looking from a window at 9.40 a.m. towards the south-east, I saw a brilliant patch of light which for a moment I took to be the sun, but which I soon perceived was part of a solar halo, the sun being (roughly speaking) 20° distant in a horizontal line.

The colours were exactly those of the rainbow, especially at

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